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ABSTRACT

The Gates-MacGinitie Reading Test and the Culture Fair Intelligence Test were administered to all pupils ages eight to eleven in the Windsor (Connecticut) Public Schools as part of an evaluation of the Individually Guided Education (I. G. E.) program. In this seven-month evaluation, all age groups achieved reading scores significantly higher than those expected of them, as determined by a comparison of their reading scores with the scores predicted by the Bond and Tinker expectancy formula. The data, which are presented in a series of tables, are interpreted as indicating that the reading component of the I. G. E. program was successful and should be continued. (AA)

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Final Report--The Evaluation of the I.G.E. Program in the Windsor Public Schools (Reading)

School Year

1973-74

Presented to

Mr. Paul Sorbo
Superintendent of Schools
Windsor Public Schools

Mr. George LeRoy
Director of Elementary Education
Windsor Public Schools

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By

Dr. Charles J. Gervase
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Final Report

The Evaluation of the I.G.E. Program

in the Windsor Public Schools (Reading)

The following is a replication (1973-74) of the procedure followed in evaluating the effectiveness of the reading portion of the I.G.E. Program in the Windsor Public Schools. The evaluation procedure consisted of the use of two definable stages:

A. Standardized Test Scores,

B. Calculation of the Reading Difference (Expectancy versus achievement).

Standardized Test Scores

The Culture Fair Intelligence Test was administered to all subjects ages 8-11 on March 18-19, 1974. The Culture Fair Intelligence Tests provide a concentrated measure of basic intelligence--giving the teacher, counselor, and school administrator a valid and reliable measure of each pupil's mental capacity. These factored tests readily single out the most consistent core of basic mental capacity, while reducing, as much as possible, the accidents of school achievement and other environmental influences on intelligence test performance.

Scale 2 of the Culture Fair Intelligence Test is a group test (which may also be administered individually) of mental ability constructed for use with children, ages 8-14, and with average unselected adults. The test is made up of two parts, I and II. Normally both parts are used together with Part I being administered first.

Each part of the test is made up of four subtests as shown in Table I. A single class period, or time of 50 minutes, is adequate for administration of the test. The test can easily be administered by any classroom teacher who has previously studied directions for administering it.

TABLE I

ITEMS AND TIME ALLOTTED TO EACH TEST
IN SCALE 2--PART II

Test	Number of Items	Time
1. Series	12	3 Min.
2. Classifications	14	4
3. Matrices	12	3
4. Conditions	8	2 1/2
TOTAL:	46	12 1/2 Min.

The Gates-MacGinitie Reading Test was administered to all subjects ages 8-11 on March 25-26, 1974. This test consists of three parts: Speed and Accuracy, Vocabulary, and Comprehension. The Speed and Accuracy portion was not utilized in this study.

The Vocabulary Test samples the student's reading vocabulary. This test contains 50 items, each consisting of a test word followed by five other words, one of which is similar in meaning to the test word. The student's task is to choose the word that means most nearly the same as the test word. The first items

are composed of easy and commonly used words. Gradually the words become less common and more difficult.

The Comprehension Test measures the student's ability to read complete prose passages with understanding. It contains 21 passages in which a total of 52 blank spaces have been introduced. For each blank space a choice of five completions is offered. The student must decide which one of the five completions best conforms to the meaning of the whole passage. The first passages are simply written, but the later ones become progressively more difficult.

Calculation of Reading Difference

(Years in school x IQ) + 1 = Expected grade performance.

The Bond and Tinker formula stated above suggests an expectancy level of performance for each child. When this expectancy is compared to his present achievement (Gates-MacGinitie) a reading difference is identified. If the difference is rather small, this would seem to indicate that the program is meeting the needs of the child. A large difference would lead one to suspect that the program may not be meeting those needs. A mean difference is calculated for each age grouping, 8-11.

Replication of this study each year enables the school system to determine the effectiveness of the reading portion of the I.G.E. Program.

Presentation of Data

TABLE II

Statement of Hypothesis

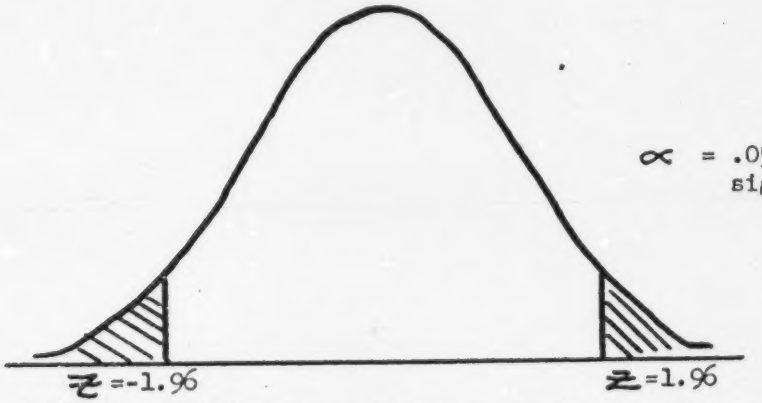
In many research studies the chief interest is in comparing two groups rather than in comparing one group to a known value. Two groups may be used to compare teaching methods, to compare two drugs, or to compare two production methods. Even when a new drug or treatment is compared to a standard, it is usually necessary to study both the new and old regimen with two samples collected under the same circumstances. Comparison of two groups is usually in terms of their mean values.[1]

μ_1 = Gates-MacGinitie (achievement) arithmetic mean.

μ_2 = Bond and Tinker (expectancy) arithmetic mean.

Hypothesis: $\mu_1 = \mu_2$ Alternate: $\mu_1 < \mu_2$

$\mu_1 > \mu_2$



α = .05 level of significance

If z-score falls in shaded area, critical area, the hypothesis will be rejected. If the z-score falls inside the unshaded area, the hypothesis will be accepted.

$$z\text{-score} = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

[1] Dixon, Wilfrid J. and Frank J. Massey, Jr., Introduction to Statistical Analysis. New York: McGraw-Hill Book Company, 1969, p. 109.

TABLE III

Interpretation of Data

8 year old group
(2.7 years in school)

Hypothesis: $\mu_1 = \mu_2$

Alternative: $\mu_1 > \mu_2$ or $\mu_1 < \mu_2$

z -score, based on data presented in tables IV and V, is 10.25. The critical area, as indicated earlier, is $z < -1.96$ and $z > 1.96$. Since this z-score, 10.25 falls in the critical area, we shall reject the hypothesis that the means are equal at the 0.05 level of significance. Rejection of the statistical hypothesis permits the choice of the alternative hypothesis, $\mu_1 > \mu_2$

The acceptance of the alternative hypothesis, $\mu_1 > \mu_2$, indicates that the 8 year old group in the Windsor Public Schools is achieving significantly higher scores as determined by the Gates-MacGinitie Reading Test than those expected of them as calculated by the Bond and Tinker Expectancy Formula.

TABLE IV

DISTRIBUTION OF READING GRADE SCORES
ACHIEVED BY 8-YEAR OLD GROUP ON
GATES-MacGINITIE TEST
2.7 Years in School

Interval (Reading Grade Scores)	Mid-Point	Frequency
0.0-0.9	.45	0
1.0-1.9	1.45	5
2.0-2.9	2.45	32
3.0-3.9	3.45	64
4.0-4.9	4.45	111
5.0-5.9	5.45	95
6.0-6.9	6.45	53
7.0-7.9	7.45	4
8.0-8.9	8.45	0
9.0-9.9	9.45	0
10.0-10.9	10.45	0
11.0-11.9	11.45	0
12.0-12.9	12.45	0

Arithmetic Mean:	4.63
Median:	4.65
Range:	1.60-7.70
Mid-Range:	4.65
Number:	364
Variance:	1.410
Standard Deviation:	1.18

TABLE V

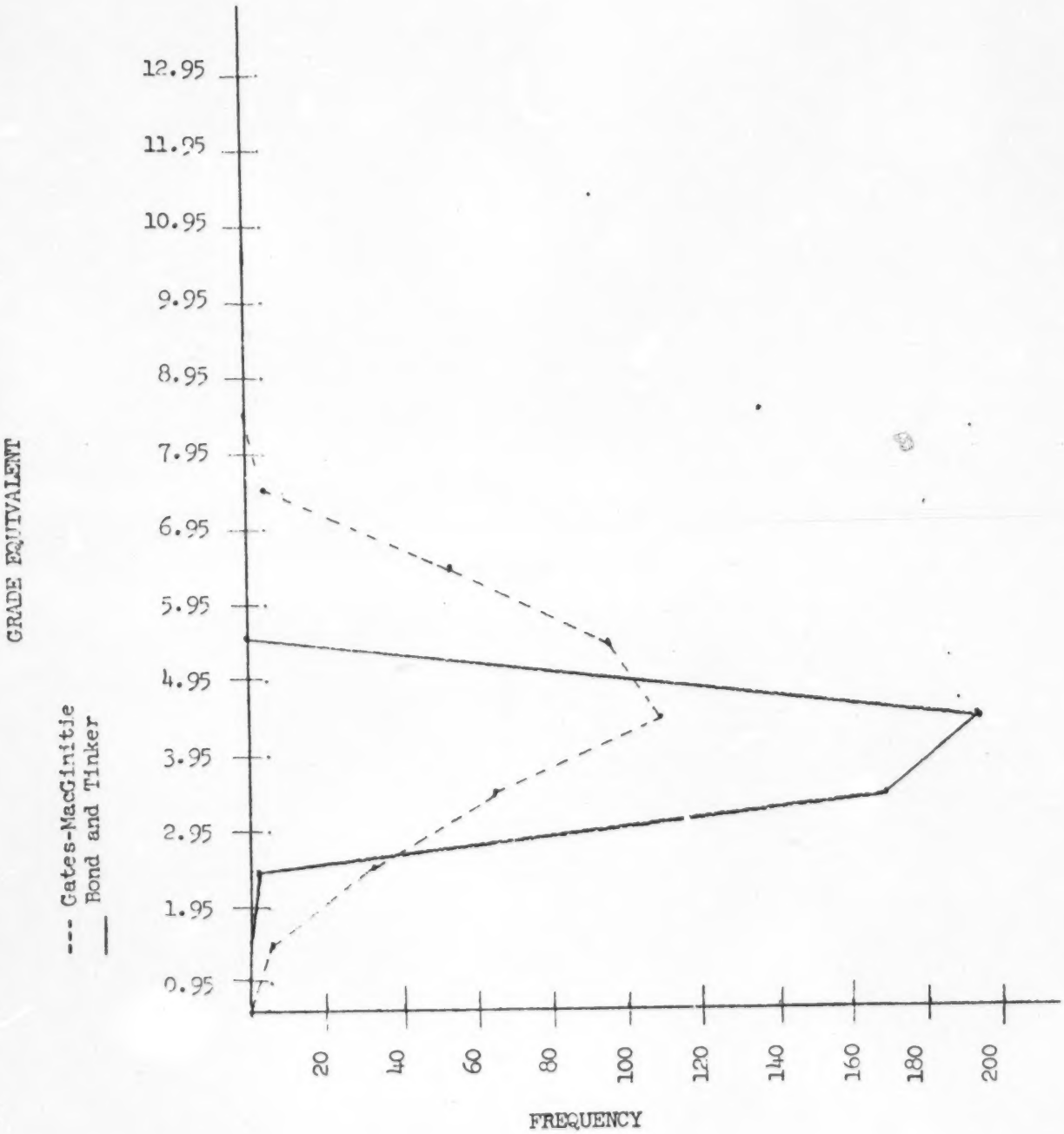
DISTRIBUTION OF EXPECTED READING GRADE SCORES FOR
8-YEAR OLD GROUP AS DETERMINED BY
BOND AND TINKER FORMULA
2.7 Years in School

Interval (Reading Grade Scores)	Mid-Point	Frequency
0.0-0.9	.45	0
1.0-1.9	1.45	0
2.0-2.9	2.45	1
3.0-3.9	3.45	170
4.0-4.9	4.45	193
5.0-5.9	5.45	0
6.0-6.9	6.45	0
7.0-7.9	7.45	0
8.0-8.9	8.45	0
9.0-9.9	9.45	0
10.0-10.9	10.45	0
11.0-11.9	11.45	0
12.0-12.9	12.45	0

Arithmetic Mean:	3.97
Median:	3.92
Range:	2.97-4.88
Mid-Range:	3.925
Number:	364
Variance:	0.100
Standard Deviation:	0.31

CHART I

DISTRIBUTION OF READING GRADE SCORES (GATES-MacGINITIE)
AND EXPECTED READING GRADE (BOND AND TINKER)
8-YEAR OLD GROUP



Interpretation of Data

(9 year old group)
3.7 Years in School

Hypothesis: $\mu_1 = \mu_2$

Alternative: $\mu_1 > \mu_2$ or
$\mu_1 < \mu_2$

Z -score, based on data presented in tables VI and VII, is 3.96. The critical area, as indicated earlier, is $Z < -1.96$ and $Z > 1.96$. Since this Z -score, 3.96 falls in the critical area, we shall reject the hypothesis that the means are equal at the 0.05 level of significance. Rejection of the statistical hypothesis permits the choice of the alternative hypothesis, $\mu_1 > \mu_2$.

The acceptance of the alternative hypothesis, $\mu_1 > \mu_2$, indicates that the 9 year old group in the Windsor Public Schools is achieving significantly higher scores as determined by the Gates-MacGinitie Reading Test than those expected of them as calculated by the Bond and Tinker Expectancy Formula.

TABLE VI

DISTRIBUTION OF READING GRADE SCORES
ACHIEVED BY 9-YEAR OLD GROUP ON
GATES-MacGINITIE TEST
3.7 Years in School

Interval (Reading Grade Scores)	Mid-Point	Frequency
0.0-0.9	.45	0
1.0-1.9	1.45	3
2.0-2.9	2.45	26
3.0-3.9	3.45	51
4.0-4.9	4.45	88
5.0-5.9	5.45	109
6.0-6.9	6.45	63
7.0-7.9	7.45	37
8.0-8.9	8.45	18
9.0-9.9	9.45	9
10.0-10.9	10.45	0
11.0-11.9	11.45	4
12.0-12.9	12.45	0

Arithmetic Mean:	5.38
Meridian:	6.70
Range:	1.70-11.70
Mid-Range:	6.70
Number:	408
Variance:	2.900
Standard Deviation:	1.70

TABLE VII

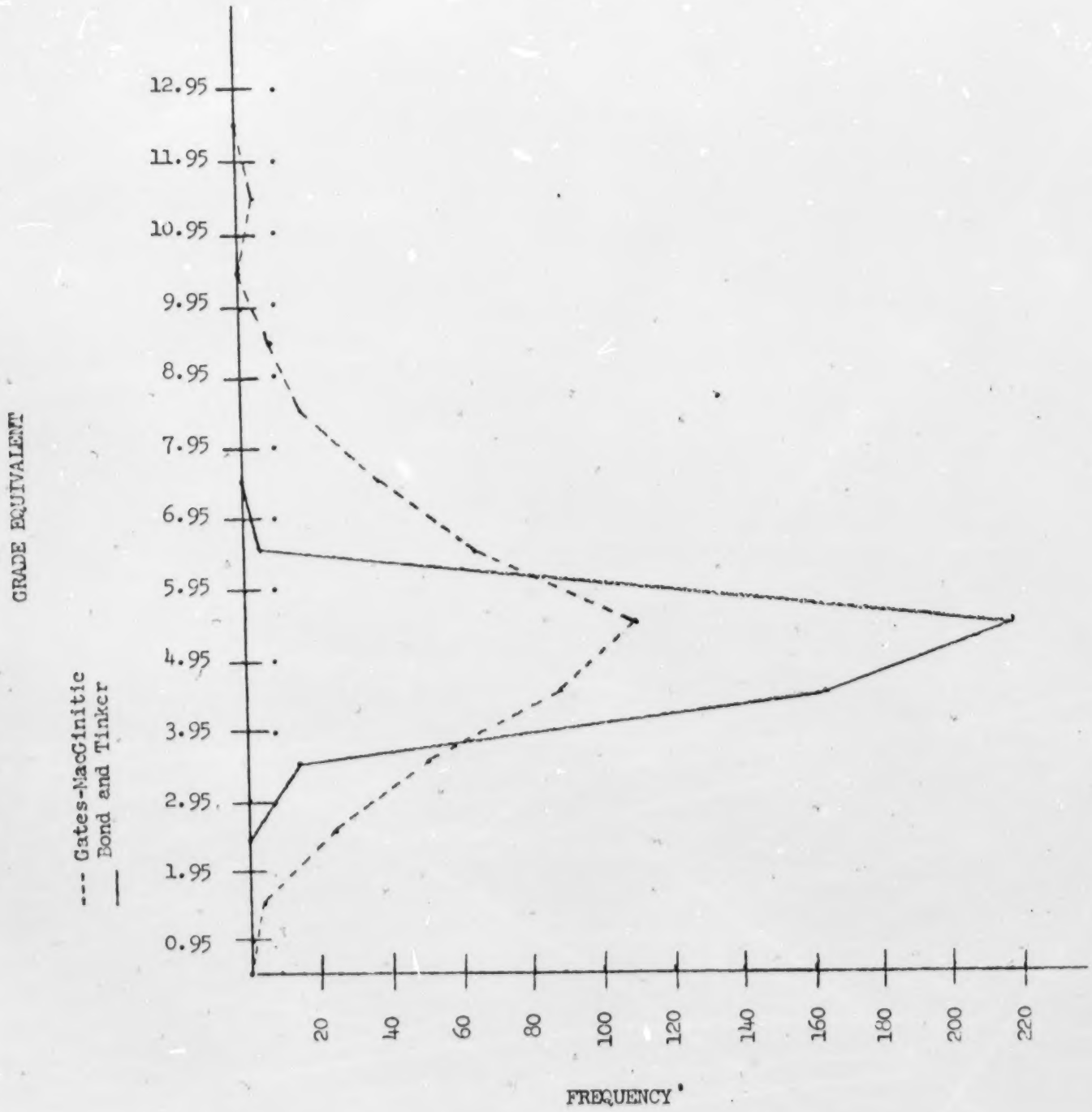
DISTRIBUTION OF EXPECTED READING GRADE SCORES FOR
9-YEAR OLD GROUP AS DETERMINED BY
BOND AND TINKER FORMULA
3.7 Years in School

Interval (Reading Grade Scores)	Mid-Point	Frequency
0.0-0.9	.45	0
1.0-1.9	1.45	0
2.0-2.9	2.45	0
3.0-3.9	3.45	14
4.0-4.9	4.45	162
5.0-5.9	5.45	216
6.0-6.9	6.45	6
7.0-7.9	7.45	0
8.0-8.9	8.45	0
9.0-9.9	9.45	0
10.0-10.9	10.45	0
11.0-11.9	11.45	0
12.0-12.9	12.45	0

Arithmetic Mean:	5.03
Median:	4.88
Range:	3.36-6.40
Mid-Range	4.88
Number:	408
Variance:	.0290
Standard Deviation:	0.53

CHART II

DISTRIBUTION OF READING GRADE SCORES (GATES-MacGINITIE)
AND EXPECTED READING GRADE (BOND AND TINKER)
9-YEAR OLD GROUP



Interpretation of Data

(10-year old group)
4.7 Years in School

Hypothesis: $\mu_1 = \mu_2$

Alternative: $\mu_1 > \mu_2$ or

$\mu_1 < \mu_2$

Z -score, based on data presented in Tables VIII and IX, is 4.81. The critical area, as indicated earlier, is $Z < -1.96$ and $Z > 1.96$. Since this Z -score, 4.81, falls in the critical area, we shall reject the hypothesis that the means are equal at the 0.05 level of significance. Rejection of the statistical hypothesis permits the choice of the alternative hypothesis, $\mu_1 > \mu_2$.

The acceptance of the alternative hypothesis, $\mu_1 > \mu_2$, indicates that the 10-year old group in the Windsor Public Schools is achieving significantly higher scores as determined by the Gates-MacGinitie Reading Test than those expected of them as calculated by the Bond and Tinker Expectancy Formula.

TABLE VIII

DISTRIBUTION OF READING GRADE SCORES
ACHIEVED BY 10-YEAR OLD GROUP ON
GATES-MacGINITIE TEST
4.7 Years in School

Interval (Reading Grade Scores)	Mid-Point	Frequency
0.0-0.9	.45	0
1.0-1.9	1.45	2
2.0-2.9	2.45	9
3.0-3.9	3.45	21
4.0-4.9	4.45	66
5.0-5.9	5.45	82
6.0-6.9	6.45	90
7.0-7.9	7.45	60
8.0-8.9	8.45	44
9.0-9.9	9.45	25
10.0-10.9	10.45	22
11.0-11.9	11.45	10
12.0-12.9	12.45	2

Arithmetic Mean:	6.56
Median:	6.85
Range:	1.50-12.20
Mid-Range:	6.85
Number:	433
Variance:	4.200
Standard Deviation:	2.04

TABLE IX

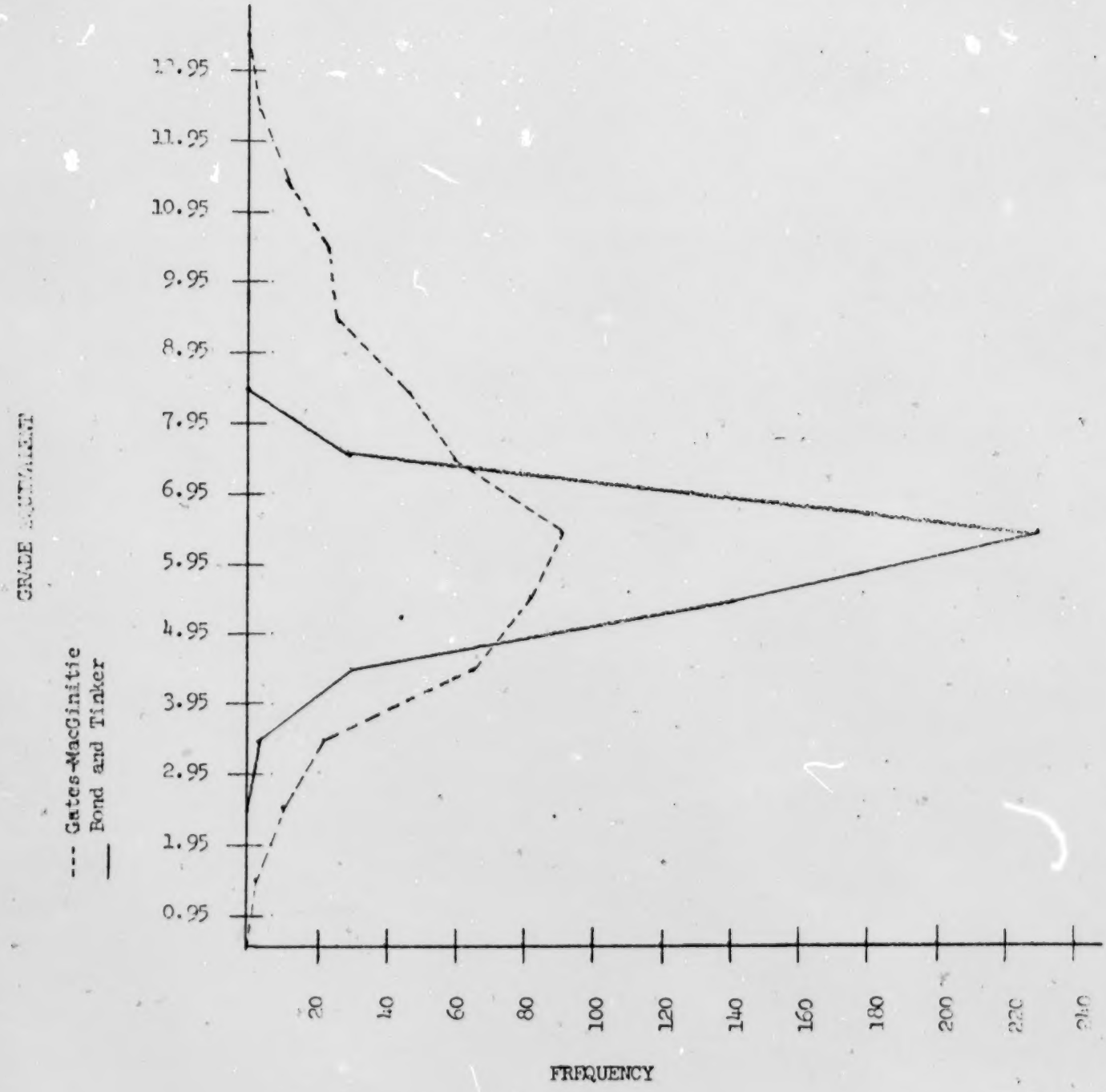
DISTRIBUTION OF EXPECTED READING GRADE SCORES FOR
10-YEAR OLD GROUP AS DETERMINED BY
BOND AND TINKER FORMULA
4.7 Years in School

Interval (Reading Grade Scores)	Mid-Point	Frequency
0.0-0.9	.45	0
1.0-1.9	1.45	0
2.0-2.9	2.45	0
3.0-3.9	3.45	2
4.0-4.9	4.45	30
5.0-5.9	5.45	141
6.0-6.9	6.45	228
7.0-7.9	7.45	30
8.0-8.9	8.45	0
9.0-9.9	9.45	0
10.0-10.9	10.45	0
11.0-11.9	11.45	0
12.0-12.9	12.45	0

Arithmetic Mean:	6.06
Median:	5.83
Range:	3.86-7.81
Mid-Range:	5.835
Number:	433
Variance:	0.470
Standard Deviation:	0.68

CHART III

DISTRIBUTION OF READING GRADE SCORES (GATES-MacGINITIE)
AND EXPECTED READING GRADE (BOND AND TINKER)
10-YEAR OLD GROUP



Interpretation of Data

(11-year old group)
5.7 Years in School

Hypothesis: $\mu_1 = \mu_2$

Alternative: $\mu_1 > \mu_2$ or

$\mu_1 < \mu_2$

Z -score, based on data presented in Tables X and XI, is 5.01. The critical area, as indicated earlier, is $Z <$ -1.96 and $Z >$ 1.96. Since this Z -score, 5.01, falls in the critical area, we shall reject the hypothesis that the means are equal at the 0.05 level of significance. Rejection of the statistical hypothesis permits the choice of the alternative hypothesis, $\mu_1 > \mu_2$.

The acceptance of the alternative hypothesis, $\mu_1 > \mu_2$, indicates that the 11-year old group in the Windsor Public Schools is achieving significantly higher scores as determined by the Gates-MacGinitie Reading Test than those expected of them as calculated by the Bond and Tinker Expectancy Formula.

TABLE X

DISTRIBUTION OF READING GRADE SCORES
ACHIEVED BY 11-YEAR OLD GROUP ON
GATES-MacGINITIE TEST
5.7 Years in School

Interval (Reading Grade Scores)	Mid-Point	Frequency
0.0-0.9	.45	0
1.0-1.9	1.45	1
2.0-2.9	2.45	3
3.0-3.9	3.45	14
4.0-4.9	4.45	33
5.0-5.9	5.45	47
6.0-6.9	6.45	75
7.0-7.9	7.45	68
8.0-8.9	8.45	53
9.0-9.9	9.45	46
10.0-10.9	10.45	42
11.0-11.9	11.45	14
12.0-12.9	12.45	20

Arithmetic Mean:	7.66
Median:	7.30
Range:	1.70-12.90
Mid-Range:	7.30
Number:	416
Variance:	5.150
Standard Deviation:	2.26

TABLE XI

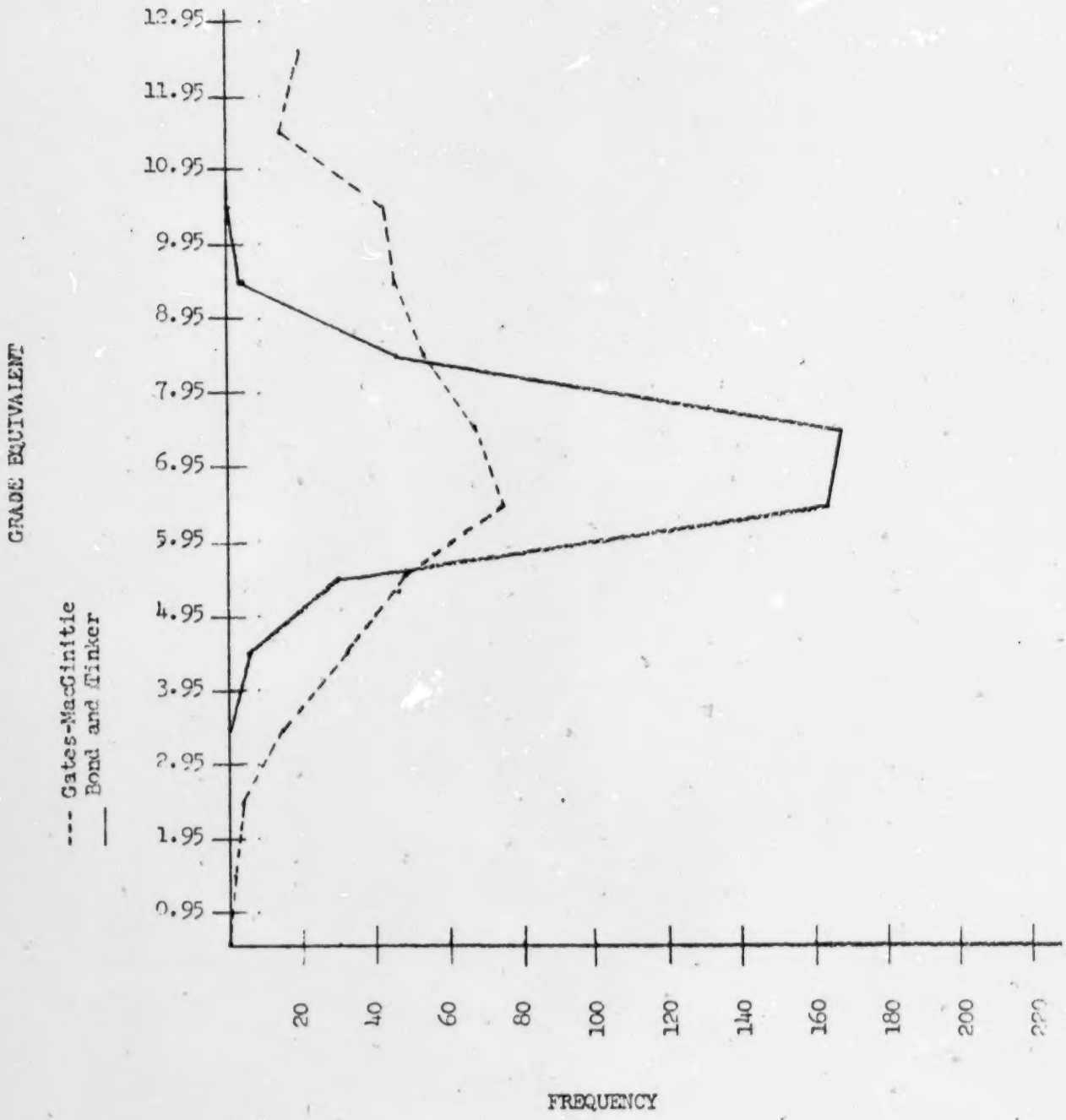
DISTRIBUTION OF EXPECTED READING GRADE SCORES FOR
11-YEAR OLD GROUP AS DETERMINED BY
BOND AND TINKER FORMULA
5.7 Years in School

Interval (Reading Grade Scores)	Mid-Point	Frequency
0.0-0.9	.45	0
1.0-1.9	1.45	0
2.0-2.9	2.45	0
3.0-3.9	3.45	0
4.0-4.9	4.45	6
5.0-5.9	5.45	30
6.0-6.9	6.45	163
7.0-7.9	7.45	167
8.0-8.9	8.45	48
9.0-9.9	9.45	2
10.0-10.9	10.45	0
11.0-11.9	11.45	0
12.0-12.9	12.45	0

Arithmetic Mean:	7.07
Median:	6.75
Range:	4.36-9.15
Mid-Range:	6.755
Number:	416
Variance:	0.630
Standard Deviation:	0.79

CHART IV

DISTRIBUTION OF READING GRADE SCORES (GATES-MacGINITIE)
AND EXPECTED READING GRADE (BOND AND TINKER)
11-YEAR OLD GROUP



Comparison Chart

1972-73
1973-74

	1973		1974	
	Gates Reading Test	Bond and Tinker Expectancy Test	Gates Reading Test	Bond and Tinker Expectancy Test
8	4.65	4.31	4.63	3.97
9	5.22	4.96	5.38	5.03
10	6.38	5.92	6.56	6.06
11	7.30	7.00	7.66	7.07

SUMMARY STATEMENT

In the interpretation of the second year evaluation of the I.G.E. reading program, caution should be exhibited in the analysis of the statistical scores listed herein since they are comprised of group data and no inferences should be made for individual class groups or schools.

1. In this 1973-74 evaluation (7 months), all age groups (8-11) achieved reading scores significantly higher than those expected of them as determined by the Gates-MacGinitie Reading Test and the Bond and Tinker Expectancy Formula.

2. This data compared most favorably with that reported for 1972-73, when all age groups (8-11) achieved reading scores significantly higher than those expected of them as determined by the Gates-MacGinitie Reading Test and the Bond and Tinker Expectancy Formula.

3. With the completion of this second year phase, it appears that the I.G.E. reading component has been extremely successful and its continuation is urged!